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ScienceDirect

Procedia Computer Science 106 (2017) 3 – 10

Procedia Computer Science

13th International Conference on Current Research Information Systems, CRIS2016, 9-11 June 2016, Scotland, UK

Scientometric indicators and collaboration network as a potential tool for *gift author* detection

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Abstract

In our research, we were looking for some criteria detecting incorrect lists of co-authors. We focused our efforts on a *gift author* problem. The term *gift author* describes a situation where a person is listed as a co-author but this person has an indirect relationship to the work. Scientometric analysis of the main publications of the Russian dissertations was performed. The open database of dissertations (website http://vak.ed.gov.ru/dis-list, websites of organizations, where dissertations were defended) and CRIS of Astrakhan State University (ASU) http://science.asu.edu.ru were used for the research.

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Peer-review under responsibility of the Organizing Committee of CRIS2016

Keywords: gift author; publication ethics; co-author networks; scientometrics; CRIS

1. Introduction

The problem of compliance with the principles of publication ethics in the preparation of scientific publications is an acute one. Committee on Publication Ethics (COPE) http://publicationethics.org and International Committee of Medical Journal Editors (ICMJE) http://www.icmje.org/ deal with some practical aspects of publication ethics. CrossCheck (http://www.ithenticate.com/) and its Russian analog Antiplagiat (https://www.antiplagiat.ru/) provide a direct check for incorrect borrowing (plagiarism) in scientific publications. Nevertheless, the publication ethics is not limited to plagiarism. Violations of the principles of publication ethics also include incorrect list of co-authors, data fabrication and falsification, multiple publications and 'salami slicing', i.e. the 'slicing' of research that would form one meaningful paper into several different papers (http://www.icmje.org/icmje-recommendations.pdf).

In our research, we were looking for some criteria detecting incorrect lists of co-authors. We focused our efforts on a *gift author* problem. The term *gift author* describes a situation where a person is listed as a co-author but this person has an indirect relationship to the work, i.e.

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Peer-review under responsibility of the Organizing Committee of CRIS2016
doi:10.1016/j.procs.2017.03.002

- his/her contribution to obtaining scientific results, to the interpretation of the results, and to preparation of the work is insignificant
- or this contribution is purely technical or organizational, but not scientific.

It should be noted that Committee of Ethics of Scientific publications (Russia) http://publicet.org/code/ offers rather a vague definition of co-authorship: 'Co-authors of the article should include all the persons who have made a significant contribution to the study. The persons who are not involved in the study cannot be indicated among the co-authors.' This formulation opens up wide possibilities for manipulating, since the 'significant contribution to the study' is not specified. In our research, we used the recommendations of ICMJE.

In some cases, a large list of the co-authors is not only justified but also inevitable, it is not necessarily indicative of malpractice in specifying of the co-authors of the publication. We perform scientometric analysis of the main publications of the dissertations. The open databases of dissertations (website http://vak.ed.gov.ru/dis-list, websites of organizations, where dissertations were defended) and CRIS of ASU http://science.asu.edu.ru are used for the research. Based on the analysis, we try to develop and offer the quantitative scientometric criteria for determining 'risk groups', i.e. dissertations in which all formal requirements are met, but the real scientific contribution of the applicant may be negligible. We designed and implemented a specialized software module for CRIS http://science.asu.edu.ru; this module provides automated collection of information, its analysis and visualization.

We took in our consideration only the journal articles related to dissertations. We analyzed the co-author networks and scientometric indicators of the articles and co-authors. Our investigation based on the hypotheses that *gift author* can be detected by analysis of objective data (co-authorship networks, scientometric indicators, etc.). This detection can be formalized and automated.

Additional criteria for classifying the dissertations as belonging to the risk group can be the following ones

- all articles are published in the same journal, or in the several journals with low scientometric indices when there is a large number of journals concerning the subject of the research,
- an abnormally high number of the applicant's publications during a year,
- an abnormally high percentage of self-citations and citations by co-authors,
- an abnormally high fraction of short articles,
- appearance of the 'twin articles',
- research topic does not imply the presence of the co-authors (the study of one object by one method).

Practical application of our research outcomes is the use of the developed scientometric criteria for identifying dissertations, the main results of which were published in articles produced with violations of the principles of publication ethics.

Scientometric and statistical methods are used for the data analysis of

1. A database which includes
   - metadata of the dissertations,
   - metadata of the journal articles in which the main results of dissertations were published
   - scientometric indicators of the journals and publications.
2. Collaboration network.

2. Proposed approach for detecting risk groups

We used the following scientometric indicators: average number of authors per article, average length of articles (in pages), dissertation's rating, rating of dissertation's author. Dissertation's rating (R_d) and rating of dissertation's author (R_{da}) are calculated by the following formulas [1]

$$R_d = \sum_{i=1}^{n} IF_i \frac{NP_i}{TNP_i},$$

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